

LOAD RUNNER

THE GALAXY'S FIRST COMPUTER COMIC

ONCE THERE WAS A MICRO MECHANIC CALLED MIKE ROMAN. NOW HE HAS BECOME THE **LOAD RUNNER** IMPRISONED IN A BIZARRE GAMES-PLAYING **COMPUTER WORLD**, HIS MEMORY WIPE CLEAN AND RE-PROGRAMMED. ATTEMPTING TO ESCAPE HE EMERGES INTO AN **ALIEN LANDSCAPE** DOMINATED BY TWO **THREATENING ARMIES...**

IT'S A GAME OF **CHESS... ON A TERRIFYING SCALE!**

THERE'S NO TIME TO REFLECT ON THIS SHATTERING DISCOVERY, HOWEVER...

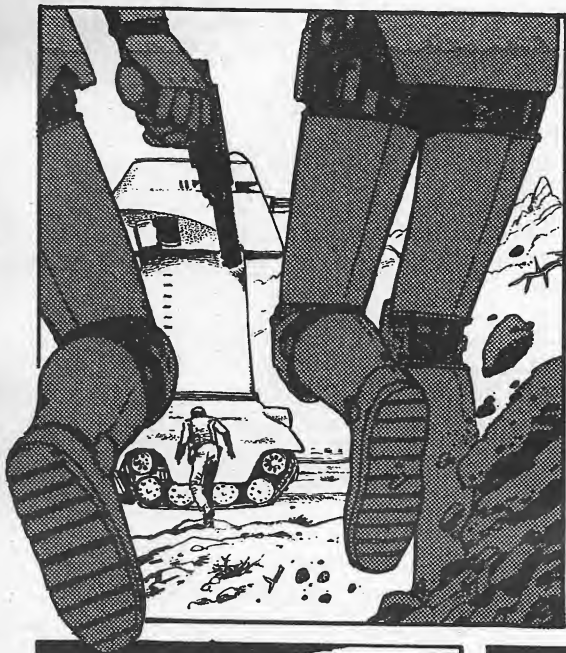
UH-UH... HERE COMES THE **GOON SQUAD... I'D BETTER SPLIT!**

WIN AN **AQUARIUS HOME COMPUTER**

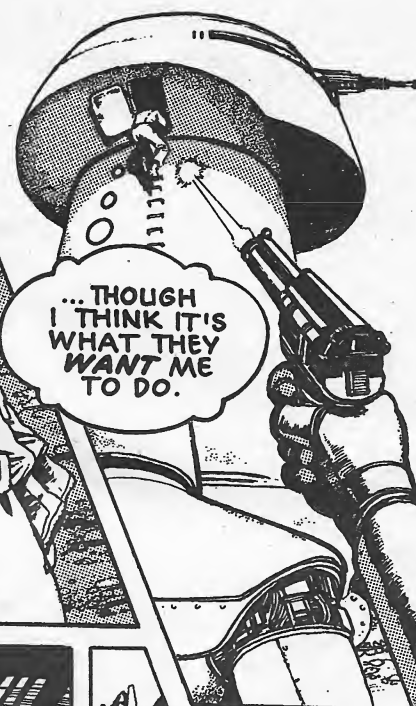
HAVE FUN WITH **ROM AND RAM**

COMPUTERS **IN SPACE**





BETTER
HIDE
INSIDE
THIS
TANK...



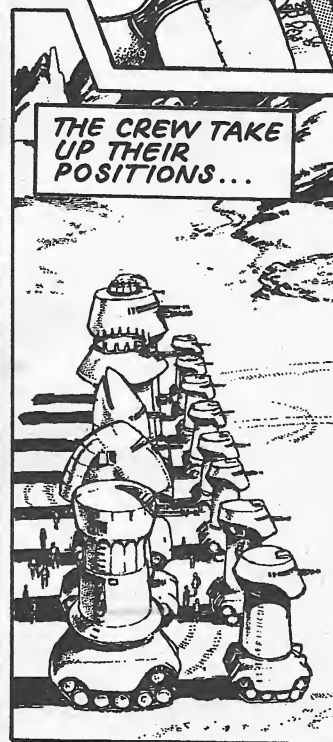
...THOUGH
I THINK IT'S
WHAT THEY
WANT ME
TO DO.



THAT
WAS
CLOSE!



I HOPE I'M
NOT EXPECTED
TO *DRIVE*
THIS THING.



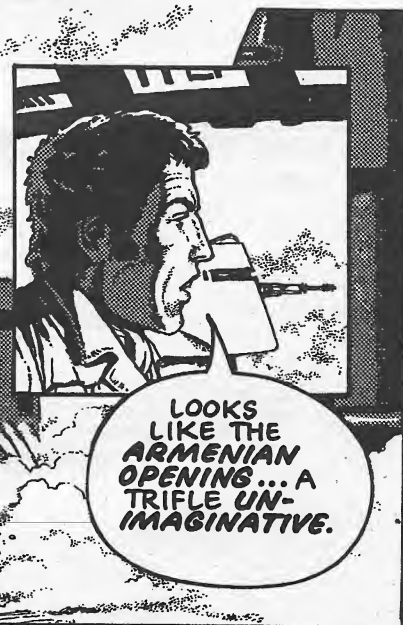
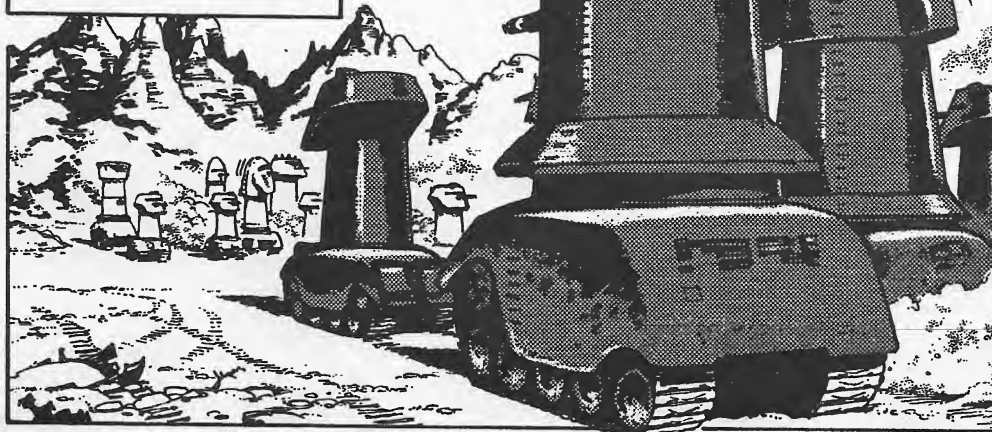
THE CREW TAKE
UP THEIR
POSITIONS...

SCRIPT:
BILL SCOLDING

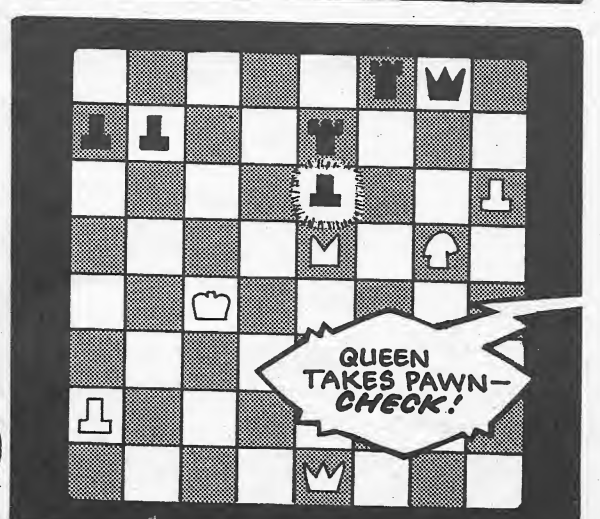
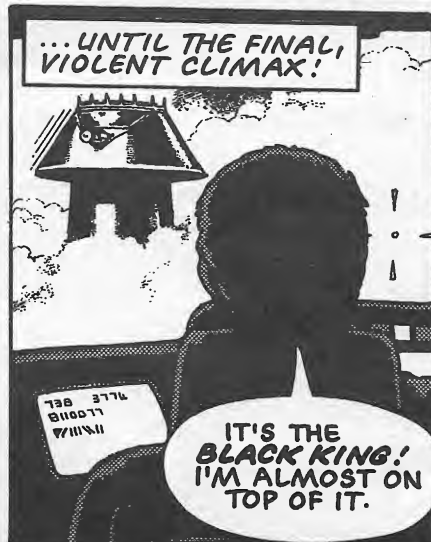
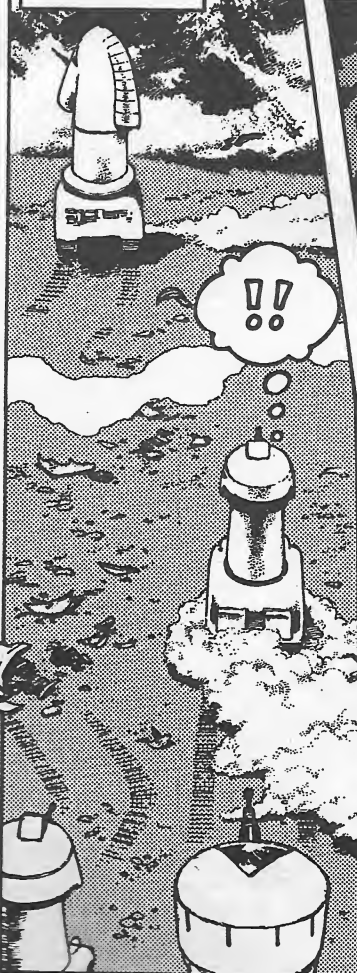
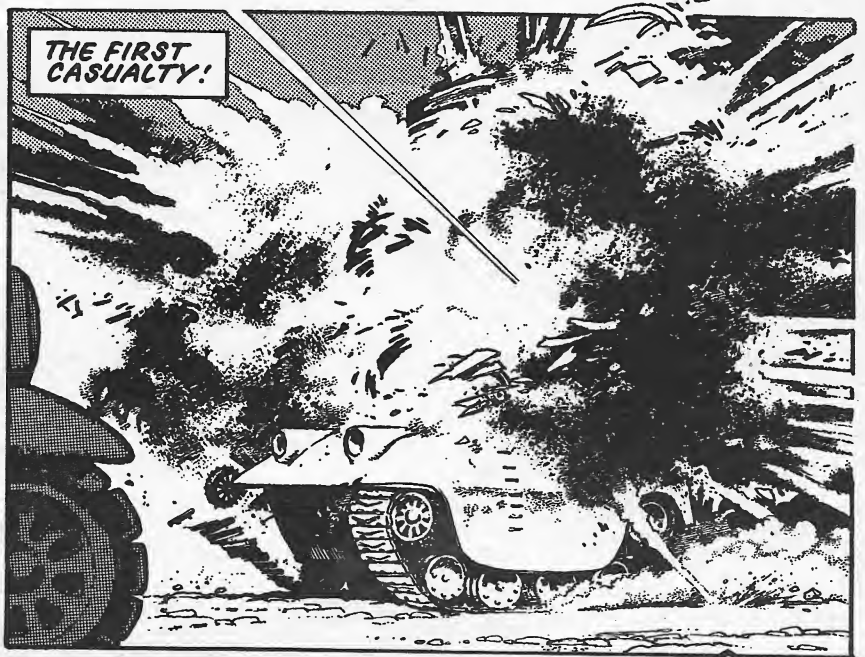
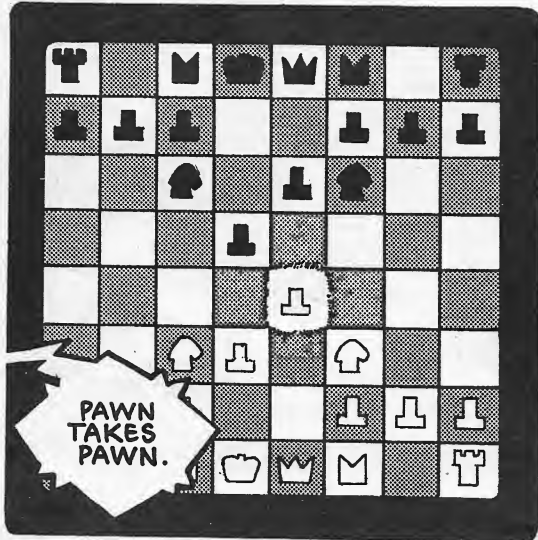
ARTWORK:
PETER DENNIS

LETTERS:
STEVE POTTER

AND SUDDENLY, THE
ARMIES ADVANCE...

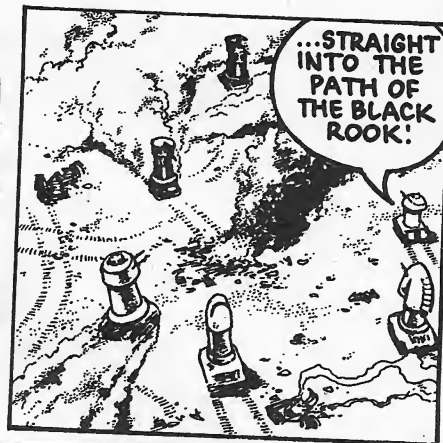


LOOKS
LIKE THE
ARMENIAN
OPENING... A
TRIFLE UN-
IMAGINATIVE.

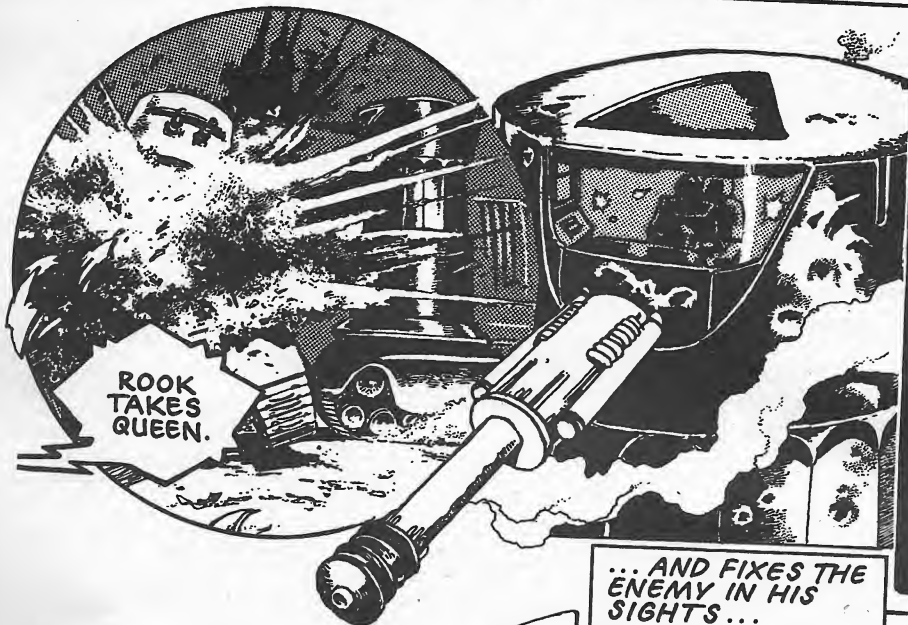




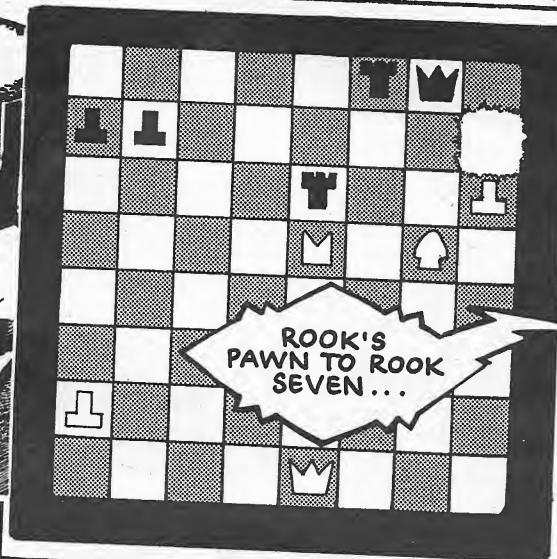
HERE
COME
THE BIG
GUNS...



...STRAIGHT
INTO THE
PATH OF
THE BLACK
ROOK!



ROOK
TAKES
QUEEN.



ROOK'S
PAWN TO ROOK
SEVEN...

... AND FIXES THE
ENEMY IN HIS
SIGHTS...

AS LOAD RUNNER
MOVES IN TO
ATTACK...



IT'S
EITHER
HIM OR
ME...



... THE COST
OF VICTORY
BECOMES
CLEAR!

IT'S A
MAN, NOT
A ROBOT...
AND ONE OF
US MUST
DIE!

NEXT ISSUE:
CHECK MATE.

WOW

■ ■ ■ ■ ■
***Make your ZX81 play some amazing games and
learn how to program in Basic at
the same time***

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ZX81 Programming For Young Programmers

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A career in computing

AS THE CONTROLLER, I am more used to giving orders than making requests but as it is the school holidays I am in a generous mood.

My request is simple. Write and tell me about your school and how it uses computers. If your letter sounds interesting I will send forth one of my operators who will take a photograph or two.

Your letter could tell me about special user groups, special software you have written, or even about games championships you have held or plan to hold.

Write soon to my installation base at LOAD RUNNER, 30-31 Islington Green, London N1 8BJ as I am anxious to hear from you.

By the way do not forget to clip out Token 3 as you are just one step away from FREE membership of the LOAD RUNNER DECODERS. Be sure to order Printout 4 from your newsagent, on sale August 4, as I will announce a special FREE draw just for Decoders.

THE CONTROLLER.

LOAD RUNNER looks at the kind of jobs available

IF USING a computer is your idea of fun, have you thought about making a career in computing? The world in which we live is becoming computerised to an extent barely dreamed of 20 years ago. Banks, factories, schools, hospitals, Government departments and many other organisations have realised that computers can help in their work and allow them to do things which previously were thought impossible.

The use of computers is widespread and growing daily. By the mid-1980s it has been forecast that the computer industry will be the third largest in the world and therefore job opportunities should be plentiful.

Computers do not work on their own. They need people to feed the information and to give them clear, logical instructions to follow. There are many kinds of jobs in computing which deal with those operations.

People who tell the computers what to do are the 'programmers' and those who run the computers are 'operators'. There are also people who prepare the information or data

By the mid-1980s the computer industry will be the third largest in the world

fed to the computer. It is possible to do all those jobs directly after leaving school, though you will need to have some O levels, or even A levels for some of them.

There are other jobs in computing, such as systems analyst, salesman, logic designer and maintenance engineer. For those, employers expect some kind of higher qualification.



If you do not find an employer to accept you immediately, there is a free Government-sponsored 42-week Threshold Scheme to give 16-19-year-olds a broad experience in programming, operating and other aspects of data processing. There are no minimum qualifications necessary but candidates must be intelligent and conscientious.

There will be more careers data, including details of the Threshold Scheme, in future printouts of *Load Runner*. In the meantime, if you want to learn more about careers in computing, ask your careers officer, the employment adviser at your local employment office or Manpower Jobcentre. For details of the Threshold Scheme write to the Threshold Administrator, The National Computing Centre Ltd, Oxford Road, Manchester M1 7ED.



TOKEN





TIME 9

WITH HIS FRIENDS KAREN AND DUNCAN, PAUL HAS SKIPPED SCHOOL TO TRY AND MAKE SENSE OF A STRANGE NEW PROGRAM HIS AKRON 90 COMPUTER IS RUNNING. PAUL'S MOTHER RETURNS HOME EARLY AND, HEARING A NOISE, INVESTIGATES...



OH!

SCRIPT -
F. HOPKINSON
PHOTOS -
H. ARDEN
LETTERS -
S. CRADDOCK



I KNEW SHE DIDN'T LIKE MY COMPUTER, BUT I DIDN'T THINK IT ACTUALLY SCARED HER.



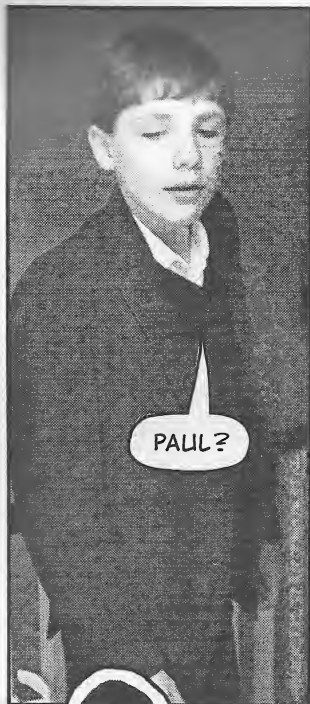
I THINK WE'D BETTER SEE WHAT'S HAPPENED TO HER. SHE FELL WITH QUITE A THUD.

OH, DON'T WORRY, I'M SURE SHE'S ALL RIGHT. MY MUM COULD DO THE ROYAL MARINES ASSAULT COURSE AND NOT FEEL A THING.



WE BETTER PUT HER TO BED. SHE'LL COME ROUND EVENTUALLY.

SHE'S KNOCKED HERSELF OUT. SHE MUST HAVE FAINTED AND HIT HER HEAD.



PAUL?



THERE'S
SOMEONE
IN YOUR
ROOM!

WHAT?!



SHHHH!

SHALL I
RING THE
POLICE?



WHOEVER IT WAS, IT WAS
A SURPRISE FOR PAUL...



WHO ARE YOU?
W... WHAT ARE YOU
DOING HERE?

I DON'T REALLY
KNOW, I WAS ON MY
WAY TO THE FORUM,
WHEN SUDDENLY IT
ALL WENT BLACK.

WHO ARE YOU?
AND WHAT'S MORE
IMPORTANT,
WHERE AM I?



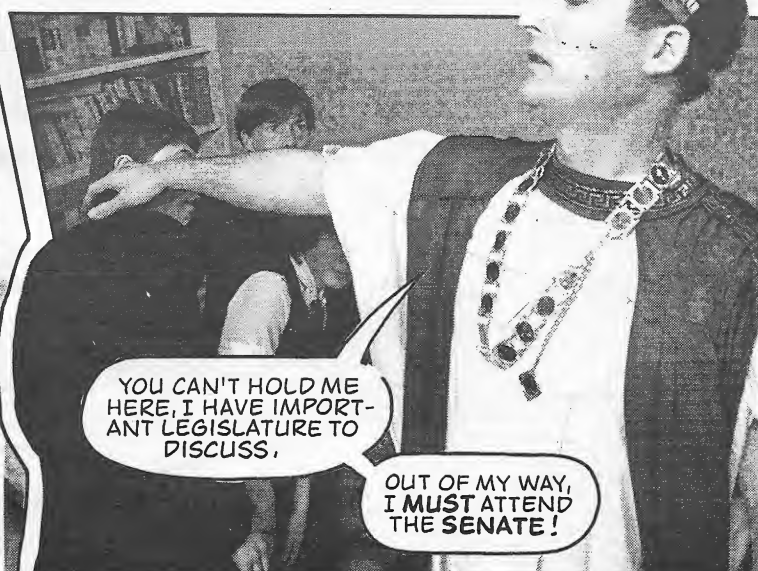
I... I'M
PAUL, THIS IS
MY HOUSE.

YOU'RE A
BURGLAR
AREN'T
YOU?

I AM
JULIUS
CAESAR.

LOOK, ARE YOU
ANYTHING TO DO
WITH THE SENATE?
I'M HAVING TERRIBLE
TROUBLE WITH THEM
AT THE MOMENT.

HE MUST HAVE
ESCAPED FROM SOME-
WHERE IF YOU ASK ME.



YOU CAN'T HOLD ME
HERE, I HAVE IMPORT-
ANT LEGISLATURE TO
DISCUSS.

OUT OF MY WAY,
I MUST ATTEND
THE SENATE!

TIME PLAN 9



BUT WHEN HE TOOK ONE LOOK OUT OF THE WINDOW...

WHAT IS THIS PLACE?

WHAT ARE ALL THESE CONTRADICTIONS?



HE LOOKS JUST LIKE THE FIGURE ON THIS COIN HE'S GIVEN US.

BUT IF HE IS WHO HE SAYS HE IS, HOW DID HE GET HERE?

A LITTLE WHILE LATER, AFTER THEY HAD EXPLAINED THE TWENTIETH CENTURY...



YOU DON'T THINK...

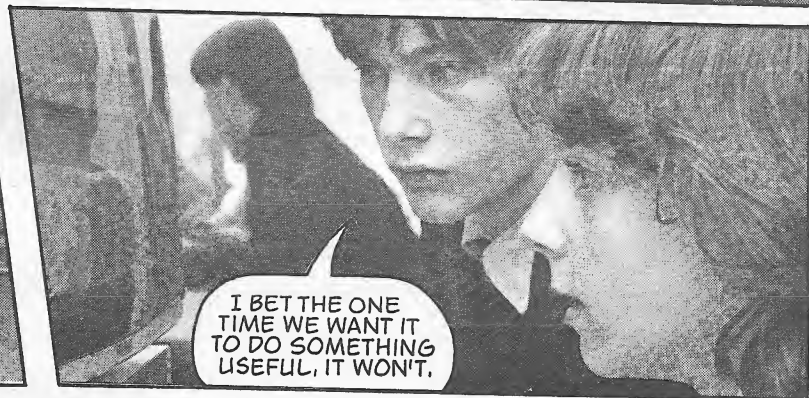
IT'S DONE SOME WEIRD THINGS ALREADY, SO WHY NOT?



ALL THAT STUFF ABOUT THE FOURTH DIMENSION.

IT'S GOT TO BE SOMETHING TO DO WITH THOSE 'TIME PLANS' THEN.

WHY DON'T YOU TRY AND GET THEM UP ON THE SCREEN?



I BET THE ONE TIME WE WANT IT TO DO SOMETHING USEFUL, IT WON'T.

TIME PLAN 1 - THE 4TH DIMENSION

21 282 26
344 56 666 879

435 487 231
321 763 348

254 665 66
767 666 55

657 76 333

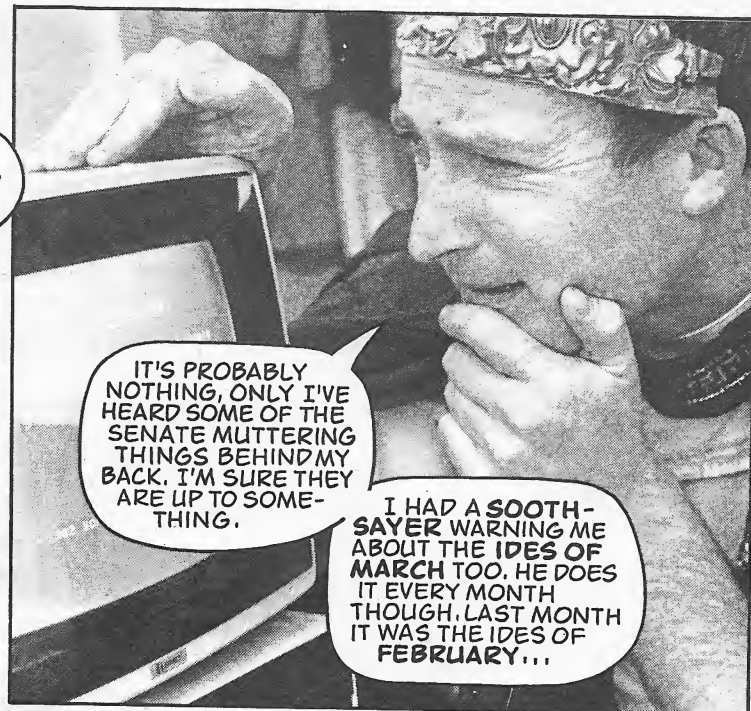
BUT PAUL WAS WRONG...



AND WE THINK IT'S THE REASON YOU'RE HERE.

IT'S A HOME COM-PUTER.

WHAT IS THIS?



48th ANNIVERSARY OFFER TO ALL READERS

COMPLETE STAMP COLLECTOR'S OUTFIT FREE!



To celebrate our 48th Birthday, we offer a Beginner's Stamp Collector's Outfit absolutely FREE. Worth 60p, it contains everything needed to start the World's Finest Hobby. Here's what it contains:-

1. HOWDEN JUNIOR loose-leaf Stamp Album.
2. Magnifier to check stamps for flaws, varieties, etc.
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4. Perforation gauge to measure stamps' perforation size.
5. Black Watermark Detector card—and instructions.
6. Tweezers for handling stamps properly.
7. Stamp Finder table—to help identify the country of origin of most stamps.
8. Land Finder World Map.
9. Packet of Stamp Hinges (mounts).
10. Full-colour facsimile of the world's Rarest Stamp, and its story. (The original is now said to be worth half a million pounds!)
11. "How to organise a School Stamp Club" leaflet.
12. Sheet of 100 Flags of the World, perforated and gummed.
13. Price List of albums, packets of stamps, accessories, used Great Britain illustrated catalogue, etc.
14. Packet of assorted different World-Wide stamps.

These items will be sent ABSOLUTELY FREE. Just fill in coupon, post it to us, with 12½p stamp for postage & packing. We also send with the outfit, one of our famous £2.00 Approval Selection Books. Just buy any you want from this book, return the rest to us with payment for the stamps bought from it. The entire £2.00 book can be bought in full at half price for only £1.00 (no need to buy anything, return the Approval Book in full if you do not wish to buy anything from it.) Please tell your parents you are sending for this FREE Outfit, and our Approvals.

Post to: PHILATELIC SERVICES, (Dept LR1), Eastrington, Goole, N. Humberside, DN14 70G.

Please send Free Stamp Collector's Outfit described above, and Special Approvals, without any obligation, on "buy or return". I enclose 12½p stamp for postage & packing.

NAME

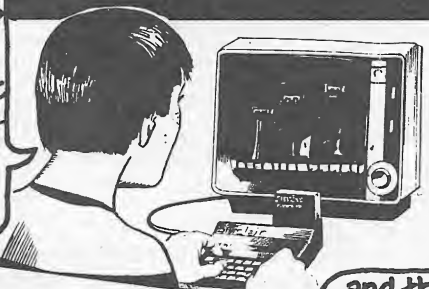
ADDRESS

(Write clearly in BLOCK letters)

How about your friends? Owing to the popularity and value of this offer, it is limited to One Outfit per applicant. Many of your friends will want this offer too. Just write their names and full addresses clearly on a piece of paper, enclose 12½p stamp for each for postage, etc., and we will send Outfit and Approvals to them. No need for them to use the Coupon above.

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on 1 tape!
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to be the best
Arcade game
he played on
my ZX81.
ALL MACHINE
CODE!!



and this
version of
the classic
Invaders
is terrific
too! 2
Great Games
for just
£3.75!



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Name

Address



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MICRO

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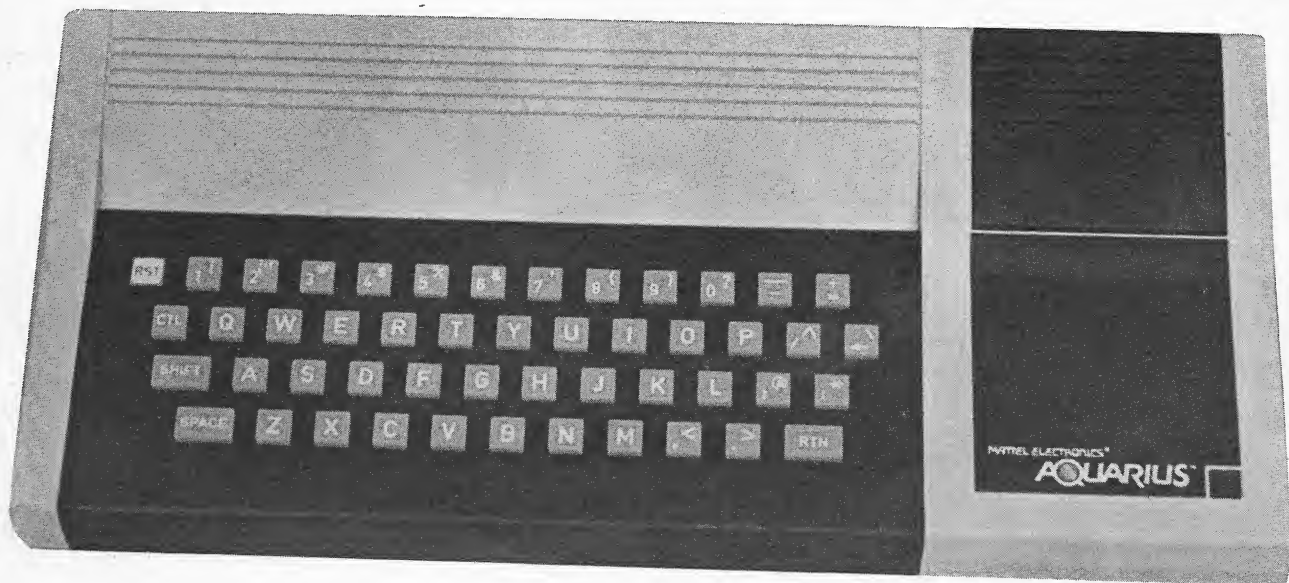
NAME

ADDRESS

Have you included your 75p?

15

Aquarius



Specifications

| | | |
|--------------------------|-----------------|--------------------------|
| Price | | £79 |
| Numbers sold | Just launched | 1,000 orders approx. |
| How sold | | Assembled |
| Processor | | Z-80A |
| Standard RAM | | 4K |
| Expansion RAM | | 52K |
| Basic + operating system | | 8K in ROM |
| Display | | 40 characters × 24 lines |
| Tape recorder | Manufacturer's | Data cassette |
| Backing storage | To be announced | Disc drives |

Software

Mattel Electronics Ltd, 3 Fulton Road, Wembley, Middlesex, HA9 0EA.

Comments

The Aquarius is a new machine which is to be launched towards the end of July. The manufacturer hopes to provide disc drives in 1983 along with a CP/M operating system which will allow the user to run thousands of software packages which have been written for bigger machines.

The computer is designed with the games player in mind but, except for the membrane keyboard, also provides scope for a small business user.

Mattel Electronics (U.K.) Ltd,
 Mattel House,
 Northend Road,
 Wembley,
 Middlesex,
 HA9 0EA.

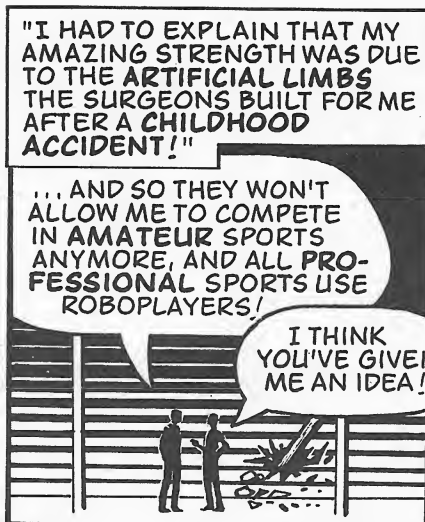
Andy Royd-the DOMINATORS' Rogue star!





HOW THE...!? HOW DID YOU MANAGE THAT? IT WAS FANTASTIC!

I'VE ALWAYS BEEN TOLD TO KEEP IT A SECRET, BUT THE CAT'S OUT OF THE BAG NOW!



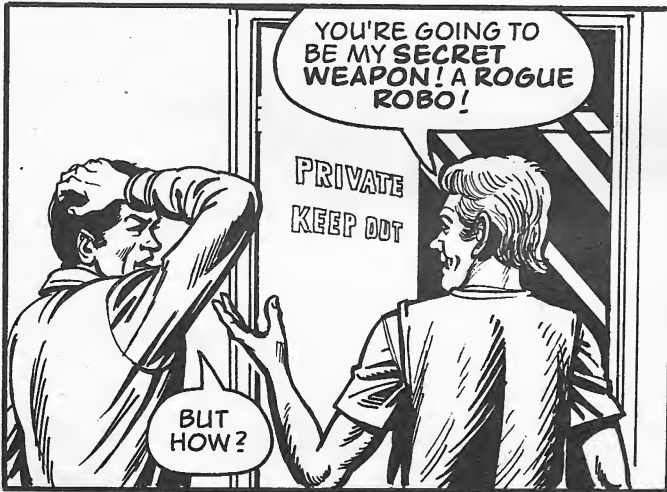
"I HAD TO EXPLAIN THAT MY AMAZING STRENGTH WAS DUE TO THE ARTIFICIAL LIMBS THE SURGEONS BUILT FOR ME AFTER A CHILDHOOD ACCIDENT!"

... AND SO THEY WON'T ALLOW ME TO COMPETE IN AMATEUR SPORTS ANYMORE, AND ALL PROFESSIONAL SPORTS USE ROBOPLAYERS!

I THINK YOU'VE GIVEN ME AN IDEA!



MY PLAN WILL HELP BOTH OF US! YOU GET TO PLAY SPORT - AND I GET A SPARE ROBO-PLAYER!



YOU'RE GOING TO BE MY SECRET WEAPON! A ROGUE ROBO!

PRIVATE
KEEP OUT

BUT HOW?

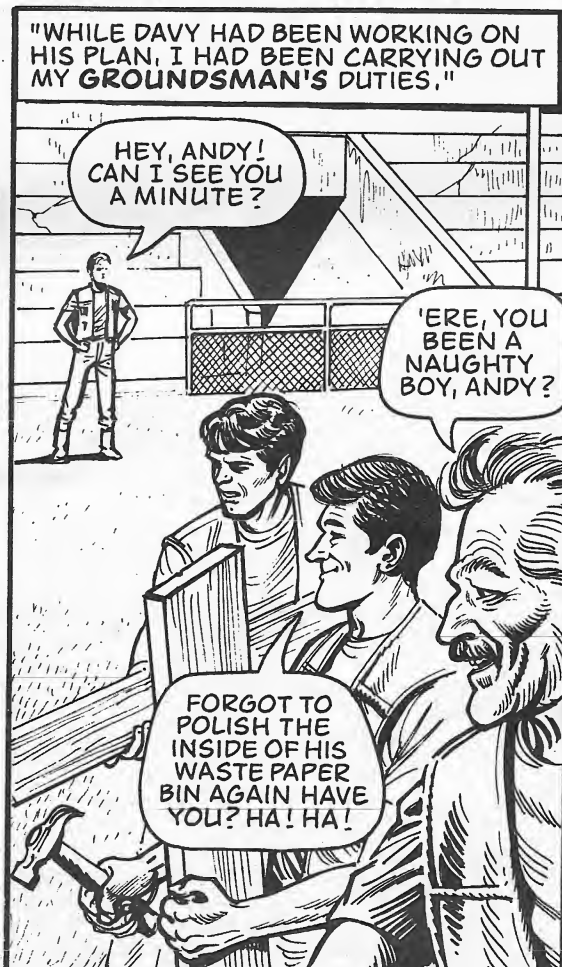


COME ON! WE'VE GOT WORK TO DO! IT'LL TAKE A COUPLE OF DAYS, BUT WE'LL HAVE YOU KITTED OUT SO NO-ONE CAN TELL THE DIFFERENCE!



"DAVY WORKED FEVERISHLY OVER THE NEXT FEW DAYS, UNTIL ..."

THAT'S IT! NOW TO FIND ANDY AND TRY IT OUT!



"WHILE DAVY HAD BEEN WORKING ON HIS PLAN, I HAD BEEN CARRYING OUT MY GROUNDSMAN'S DUTIES."

HEY, ANDY! CAN I SEE YOU A MINUTE?

'ERE, YOU BEEN A NAUGHTY BOY, ANDY?

FORGOT TO POLISH THE INSIDE OF HIS WASTE PAPER BIN AGAIN HAVE YOU? HA! HA!



"IT WASN'T ILLEGAL FOR HUMANS TO COMPETE AGAINST ROBOPLAYERS - JUST VERY DANGEROUS!"

THIS MASK WILL HIDE YOUR FEATURES. IT WILL ALSO KEEP YOU IN CONTACT WITH THE COMPUTER THROUGH A SPEECH SYNTHESISER!



"DAVY WAS ANXIOUS TO TRY OUT HIS NEW PLAYER...!"

I'LL JUST PROGRAM THE COMPUTER TO RUN THROUGH A FEW PRACTICE MOVES WITH ANDY!



I'VE GOT A BETTER IDEA! THEY'VE LEFT THEMSELVES WIDE OPEN THROUGH THE MIDDLE!

TAKE IT DOWN THE WING AND CROSS IT FOR THE N°9!

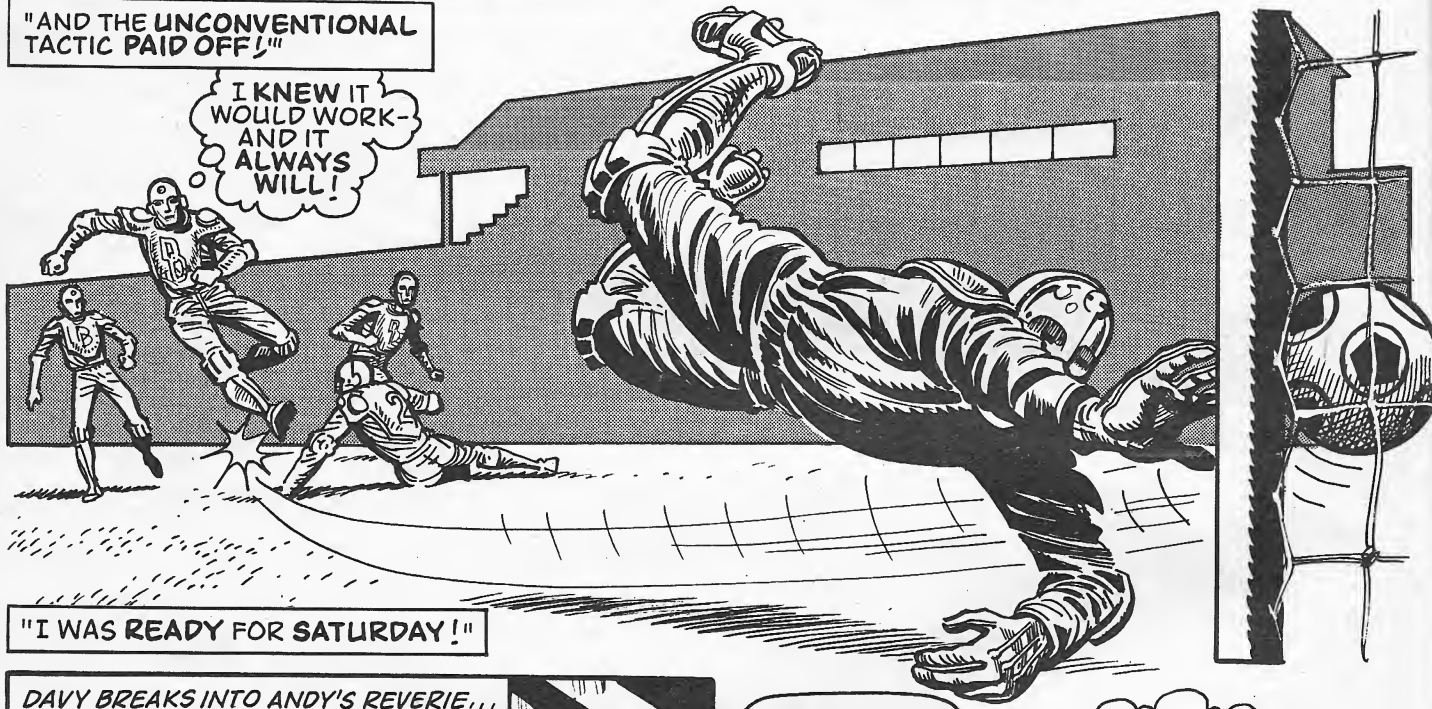
"MY NATURAL SPORTING BRAIN HAD SPOTTED A FLAW IN THE COMPUTER PROGRAM!"

I MUST SHOW HIM I CAN DO THIS ON MY OWN!



"AND THE UNCONVENTIONAL TACTIC PAID OFF!"

I KNEW IT WOULD WORK- AND IT ALWAYS WILL!



"I WAS READY FOR SATURDAY!"

DAVY BREAKS INTO ANDY'S REVERIE...

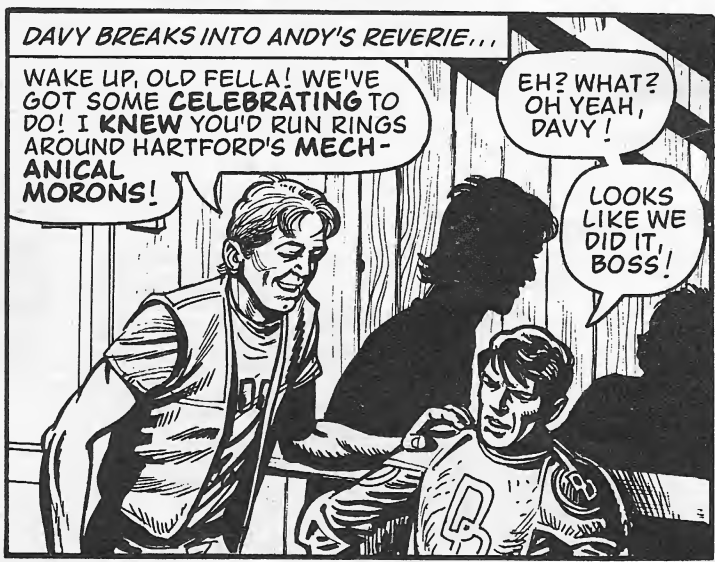
WAKE UP, OLD FELLA! WE'VE GOT SOME CELEBRATING TO DO! I KNEW YOU'D RUN RINGS AROUND HARTFORD'S MECHANICAL MORONS!

EH? WHAT? OH YEAH, DAVY!

LOOKS LIKE WE DID IT, BOSS!

YUP! WE MAKE A GOOD TEAM! I'LL GIVE THE ORDERS...

...AND I'LL IGNORE THEM!



NEXT ISSUE > PREPARATIONS FOR THE NEW SEASON!

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BBC B and ZX81 16k
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FORTH: A full implementation. Ideal for writing fast moving arcade type games. Allows the full colour and sound facilities of the Spectrum to be used. Future Microdrive enhancements will be made available.

**Spectrum
14.95**

ADVENTURE ONE: Features a save game routine as the game can take months to complete.
'a remarkably good version....well worth the money.'
...Sinclair User...

ZX81 £5.95

MAZEMAN: A fast action m/c game that reproduces the spirit of the original.
'...is very accurate and fast.' ...Which Micro?...

**Spectrum
£4.95
ZX81 £4.45**

CHESS 1.4: Ten levels of play with this m/c program. Good graphic screen display.
'In a class of it's own.' ...Your Computer...

ZX81 £5.95

INVADERS: Very fast m/c action. Includes mystery ship and increasingly difficult screens.

ZX81 £4.45

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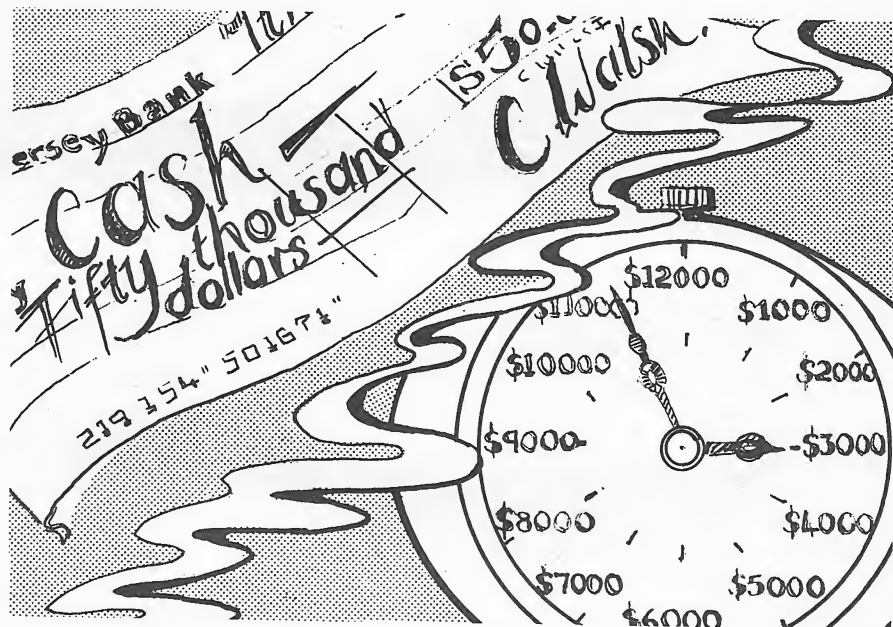
Ode from a micro

THE COMPUTER at Nene College, Northampton was programmed to write poetry by the two lecturers, John Neville and Graham Saddington. After 18 months of preparation the program containing a vast bank of words and phrases was loaded. The computer, taking a random selection of words, created its own poem. Here are the last five lines:

And so it is in my depth concealed,
this store keeps yet the greatest truth of all
and to men shall it never be revealed.
So consider, take heed of what I say
This day you rule, tomorrow I hold sway.

The temptation of Mr Walsh

BUSINESS was bad for Charles Walsh, a coin dealer of Jersey City, U.S.A. He had only \$42 in the bank, until one day his statement arrived showing a balance of \$50,042. The temptation was too much for him; he cashed a cheque for \$50,000, shut up shop, and promptly disappeared. Months later the bank discovered the error. Walsh's account number differed by only one figure from that of a large commercial company and the operator had pressed the wrong number.



Computer time equals money

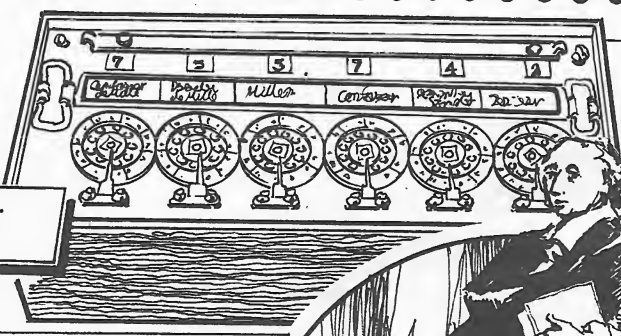
TWO COMPUTER experts, David Sampson and Gary Miller, were arrested in January, 1978 for stealing possibly millions of dollars worth of time from the U.S. Defense Department Illiac 4, the world's largest computer. As it was impossible to prove how much time they had stolen, they were charged with stealing "computer time and storage in excess of \$100". A hundred dollars worth of time on the monster computer would be no longer than a millisecond.

The Computer Story

A HISTORY OF COMPUTERS
PART THREE

THE DEVELOPMENT OF MECHANICAL CALCULATORS INVOLVED SOME OF THE GREATEST MEN OF SCIENCE, MATHEMATICS AND PHILOSOPHY. LEONARDO DA VINCI DESIGNED A CALCULATING MACHINE IN THE 15TH CENTURY, BUT SO FAR AS IS KNOWN IT WAS NEVER BUILT. THE FIRST MECHANICAL CALCULATOR WAS MADE BY THE GERMAN ASTRONOMER WILHELM SCHICKARD IN 1623, BUT IT WAS DESTROYED BY FIRE AND NEVER REBUILT. BEFORE SCHICKARD'S WORK CAME TO LIGHT, THE MAN CREDITED WITH THE FIRST CALCULATING MACHINE WAS PASCAL....

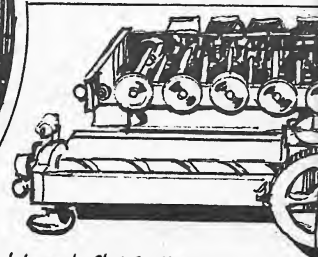
CALCULATING MACHINES



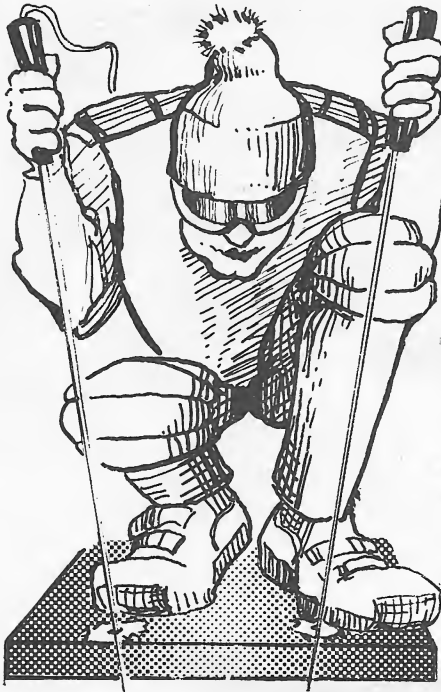
A GREAT MATHEMATICIAN AND PHILOSOPHER, BLAISE PASCAL BUILT AN ADDING MACHINE (LEFT) IN 1642 - AT THE AGE OF NINETEEN - TO HELP HIS FATHER'S JOB IN ASSESSING TAXES IN FRANCE.

IT USED A TRAIN OF COGS IN THE SAME WAY THAT A MECHANICAL MILEOMETER OR COUNTER WORKS TODAY.

THE "PASCALINE" WAS NOT WIDELY USED AS IT WAS CHEAPER TO HIRE A MAN THAN BUY A MACHINE.



Written and drawn by Chris Smithers



Feet-on Experience?

FROM THE UNITED STATES—where else?—the latest in user-friendly hardware, the Joyboard, a computer controller on which the user stands. Linked to a personal computer, the player can use his body for games such as Surf's Up and Mogul Maniac—a skiing simulation. The Joyboard, launched by the Amiga Corporation in California, can also be used to play maze adventures such as Ms Pacman and 'body play party games'. The mind, or rather the body, boggles.

● Buzzwords are the jargon of the computer world and can be very confusing. Below, *Load Runner* continues its glossary of computing terms. Get buzzing.

● **Batch.** Putting together all the information which the computer will need to do a job. Batch programming is not performed usually on a microcomputer, as the memory requirements for such a task are too great. Such a method is often used on large mainframe computers which can deal with more than one job at once.

● **Baud.** The rate at which information is transmitted from one part of a computer to another. It can also mean the amount of information which can be put out, or output, from a computer to its tape storage device in one second.

● **Benchmark.** A series of tests to show how powerful a computer is and what it can do. A benchmark is usually a program which many people agree is standard and which is used to test computers.

● **Binary.** A number system which uses only 1 and 0 instead of the numbers 1 to 9 which we use usually. The information which is typed into the computer is converted into binary so that the computer can understand it.

● **Bit.** A binary 1 or 0 which represents one piece of information in a computer.

● **Black box.** Used when referring to

computers in a derogatory sense. It can also be used to describe the box in which a Winchester disc is stored.

● **Block diagram.** A diagram which illustrates the parts of a computer. Each piece of computer hardware, or software, is put into a box and if it is connected to any other piece of equipment a connecting line is drawn.

● **Board.** Often referred to as the printed circuit board — PCB. All the electronic components of a computer are laid out on the board and that can usually be found beneath the keyboard in a microcomputer.

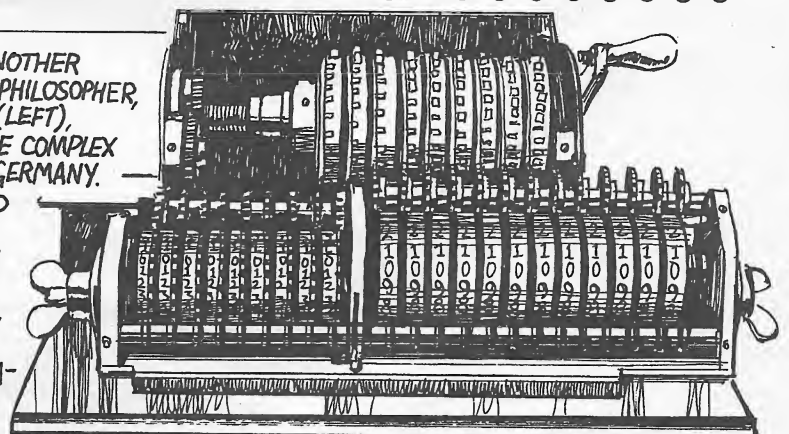
● **Boolean Algebra.** A set of logical instructions which indicate whether a statement is true or false. Common instructions, called operators, are < for less than, > for greater than and = for equal to. For instance, 2=3 would mean two is equal to three, which is false.

● **Bootstrap.** A program which needs to be fed into a computer before it can operate properly. This program usually allows other user programs to be loaded into a mainframe computer. One microcomputer which uses a bootstrap program to get it to work in Basic is the RML 380-Z.



THIRTY YEARS LATER ANOTHER MATHEMATICIAN AND PHILOSOPHER, GOTTFRIED LEIBNIZ (LEFT), INVENTED A MORE COMPLEX RECKONER IN GERMANY.

HE INTRODUCED THE "STEPPED-WHEEL" WHICH SPEEDED UP CALCULATIONS, BUT USED THE DECIMAL SYSTEM WHICH IS IRONIC, SINCE HE ALSO PERFECTED THE BINARY SYSTEM WHICH WAS ESSENTIAL TO THE DEVELOPMENT OF COMPUTERS. FOR SOME REASON HE DIDN'T INTEGRATE IT WITH HIS MACHINE. OTHERWISE THE HISTORY OF COMPUTERS MIGHT HAVE BEEN VERY DIFFERENT.



THE LEIBNIZ PRINCIPLE WAS THE FOUNDATION OF MOST LATER DESIGNS OF MECHANICAL CALCULATOR FOR SCIENTIFIC, MATHEMATICAL AND ENGINEERING USE. THESE CULMINATED IN THE "BRUNSVIGA" MACHINE (ABOVE), MANUFACTURED IN GERMANY FROM 1892. THE DESIGN WAS CHEAP AND RELIABLE—AND COMMERCIALY VERY SUCCESSFUL. MANY THOUSANDS WERE SOLD WELL INTO THE 1960s. THE MECHANISMS WERE VERY INGENUOUS AND ELEGANT, BUT THESE MACHINES BECAME OBSOLETE WITH THE INTRODUCTION OF ELECTRIC DESK CALCULATORS.

TEL

STARS

LOAD
STARS





*Arcade
addict*

DAVE LEE TRAVIS

*battles against
Taitel's latest game*

GYRUSS

*at the Computer & Video
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Championships.*

Shut down all systems! It's . . .

COUNT DOWN TO CHAOS

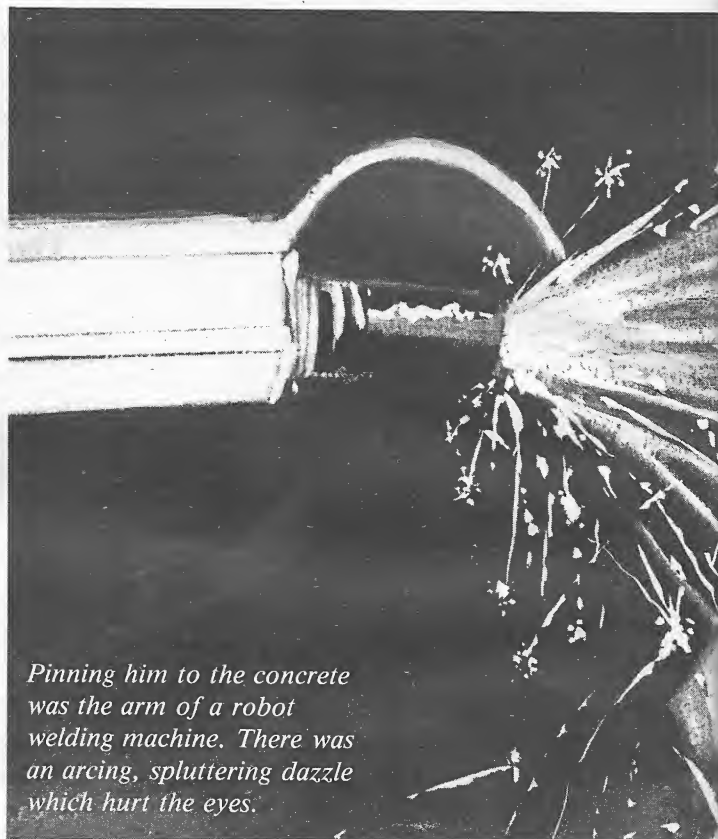
by Philip Steele

"YOU DON'T KNOW what you've got till it's gone". That is what they say in the song, and it's true. Most people didn't realise how much they depended on the microchip, until all over the world micros and macros began to fail.

Microchip Mayhem and Komputers go Kaput screamed the headlines. That didn't seem so funny when airports closed, and trains were derailed. Joe and Ellie were watching the TV with growing anxiety. Their dad hadn't returned from work and their mum was worried. Suddenly the programme was interrupted by a news flash—the world was four minutes from nuclear war. Then the TV blacked-out . . .

MOST PEOPLE in Canada live in the south, along the border with the United States. The north of the country lies above the Arctic Circle—an empty, frozen waste, a desolate world in which there is no place for mankind, yet humans are to be found there. There are Eskimo settlements and there are the bases of the Distant Early Warning Line, a hi-tech necklace strung across the Arctic ice. It is designed to warn of nuclear attack.

INSIDE the bases that night the feeling of panic had turned to fear and confusion. "I just don't get it", groaned Eric Paterson, a bearded technician. "First of all the VDUs light up like Christmas trees. Then they



Pinning him to the concrete was the arm of a robot welding machine. There was an arcing, spluttering dazzle which hurt the eyes.

keep changing their minds. Was an attack registered or wasn't it? Did we launch any missiles in return? It's all gone dead."

"Contact with HQ?" asked Joe Wilson, his assistant.

"Negative, negative. For all we know the whole world has blown itself to bits and this old lump of ice is heading for the moon".

Then the door burst open and the base director, Jean Voisin, stormed in.

"Eric, we're getting somewhere. The micro-circuitry seems to be corroding. It isn't nuclear war—it's something twice as weird. Chemical warfare? Who knows?"

"Well", said Eric, "there's nothing we can do. I guess we will have to sit and figure it out. Or wait for someone to come and rescue us. At least we're alive".

Outside, the landscape was as empty and cold as the black polar night above it. Only the stars twinkled and a comet cast a pallid glow on its way past the planet Earth.

IN JOE and Ellie's sitting-room there was the same feeling of fear and confusion. Joe was the first to break that terrible silence.

"Mum. It's been about 10 minutes now. Nothing's happened". Their mum was sobbing quietly.

"Mum, it's going to be all right after all". Ellie gave her a hug.

Suddenly they became aware of the world outside their four walls. It was as if the whole city, the whole country, had been holding its breath in silence. Now there was some shouting at the end of the street. The back door banged.

"Oh, is that your father?" asked mum. "Who's there?"

"It's me, Winston Todd" Winston was their next-door neighbour. "Are you all OK?"

"Oh, Winston. Are you sure it's all right to go out? What on earth's going on? Is there a war or isn't there? Have you seen my Jack?"

"You sit down and take it easy", said Winston. "We'll make you a nice cup of tea. Now, you get the tea, Joe. Ellie, put the kettle on."



In the kitchen, Ellie scratched her head.

"Joe, it all fits in, you know. All those horrible missiles and the armies and so on use computer systems, don't they? If their computers have broken down, then it must have been a false alarm."

"Perhaps," said Joe. "And I'll bet the telly packed up for the same reason—no satellites, no nothing!"

"The way things are going", said Ellie, "we'll be back in the Stone Age soon".

"Hey, why don't we slip out and go to meet dad?" Joe suggested.

"Oh, for heaven's sake, Joe—and leave mum alone?"

"She's not alone, she can go next door".

"But she'll be worried sick".

"We'll leave a note. She will scarcely be worried about us just walking down the street when half an hour ago we thought we were going to have a nuclear war".

"Oh Joe, I don't know".

"Look, Ellie, dad's probably halfway home already." They wrote a quick note and slipped out of the back door.

THE HIGH STREET, at 9 pm. It was as if the war had just ended—except that there had been no war. There were no trains rumbling across the bridge. Buses and cars were left empty in the middle of the road and small groups of people were talking and arguing on street corners. An old man staggered by singing *Auld Lang Syne* at the top of his voice.

"It's like a party", said Joe. "Don't they realise that the disaster is really only just beginning? Unless we can find why the computers are going wrong..."

"Joe, what's that?" Ellie swung round at the sound of a loud crash along the street.

"El, there's a bloke running off with a TV set".

"Fat lot of good it'll do him now".

Glass splintered in the gutter as a brick flew through another shop window.

"Joe, they're looting the shops".

"Should we ring the cops?"

"The 'phones aren't working".

At that moment a police car screamed along the street and skidded to a halt. A crowd gathered.

"They're here anyway. Let's get going. We came to find dad, didn't we? Well, he's not here".

The factory loomed large and dark against the city lights. The main gates were open. The lights still burned at the check-in but the door was open and banging in the wind. Nobody in—the scare had run around town like wildfire. The security guards seemed to have fled as well. As Joe and Ellie stepped forward they shivered a little. The place was spooky—so empty and dark. The previous year the factory had had a new robot system installed and, with that out of order, work was out of the question.

"We've got to go in. Dad might be in trouble. We would have passed him on the street if he'd been on the way home".

"Where do we look for him?"

"He showed me round the works two months ago. He was working over there". Joe pointed to a large building across the car park. No ordinary car park—row upon row of new models straight from the production line and a row of large transporters ready for the off.

"Let's take a short cut".

"Over the fence?"

"Why not?"

"Right. Have a mint."

"Ta". Ellie put a large mint in her mouth and sucked.

After a day like that she would be ready for anything. Up she scrambled, wobbled at the top, and then slid down the other side of the wire, grazing her wrist. Joe dropped down behind her.

"You OK?"

"Whew! Yes, I think so".

The two set off across the great yard, picking their way through the ranks of dark, shiny vehicles. Joe frightened a skinny old tomcat, which ran off into the night, yowling. In another part of town police sirens were

**"Don't they realise
that the disaster
is really only
just beginning?"**

wailing. Joe and Ellie reached the back of the building. They entered through a loading bay and then passed through a broad corridor into a section of the works.

"Hello! Hello!" Joe's voice echoed around the great cavern. "Is anybody there? ... there? ... there?"

The production line lay idle, the machinery was bathed in a pale half-light. A neon strip was flickering like a strobe.

"Joe, I thought I heard something". He listened carefully. 'No, hang on—some kind of moaning? Over there.'

They rounded a large concrete pillar; another long hall lay ahead. At the end of it the light seemed to grow brighter. Joe and Ellie ran down the line. It seemed endless. Joe stumbled at one point but Ellie dragged him back to his feet. As they turned into a bay, they found what they were looking for. Their dad lay slumped against the wall. He was pale and mumbling incoherently. His arm shielded his eyes. Pinning him to the concrete was the arm of a robot welding machine. There was an arcing, spluttering dazzle which hurt the eyes.

CONTINUED IN NEXT PRINTOUT.

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THE ADVENTURES OF ROM AND RAM

THE STORY SO FAR: ROM AND RAM, SENT FROM ZILLYKON TO INVESTIGATE EARTHINGS' WAR CAPACITY, ARE INSIDE THEIR SPACESHIP, CUNNINGLY DISGUISED AS A COMPUTER...

THAT'LL LEARN YA TO GO MESSIN' WITH THE MAN WITH NO NAME!

GALLOPING GALATANS! CUT IT OUT ROM. HOW COME YOU ALWAYS GET TO BE THE GOOD GUY IN THESE GUNFIGHT GAMES?

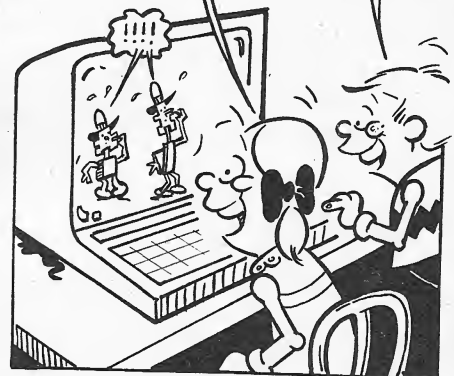
JUST CLEAN LIVING I GUESS, PARDNER...

WELL, I WISH THE HUMANIDS WOULD GIVE US A REST. ISN'T IT TIME THEY WENT TO SCHOOL?

BAD NEWS, LADS!

JUST THINK NO MORE SCHOOL FOR SIX WEEKS!

YEAH! WE CAN PLAY ON THE COMPUTER ALL DAY LONG!



THIS IS TERRIBLE! I'LL NEVER LAST...

...AND WHAT ABOUT OUR MISSION... SOMETHING MUST BE DONE, AND SOON!

I'LL THINK OF SOMETHING. YOU STAY HERE AND KEEP THEM OCCUPIED WHILE I EXPLORE.

THANKS A ZILLION, ROM. I JUST HOPE I'M STILL ALIVE WHEN YOU GET BACK.

I'M BORED WITH 'GUNFIGHT' - LET'S PLAY SOMETHING ELSE.

OKAY, LET'S LOAD THE FROGGER TAPE.

OH, GORE! WHERE DID I PUT THOSE FLIPPERS...



MINUTES LATER...

WHAT A WEIRD FROG. THIS COMPUTER HAS THE STRANGEST GRAPHICS!

LOOK AT THAT SILLY FROG JUMP!

WATCH IT! HERE COMES A TRUCK! SPLAT!!! HEE! HEE!

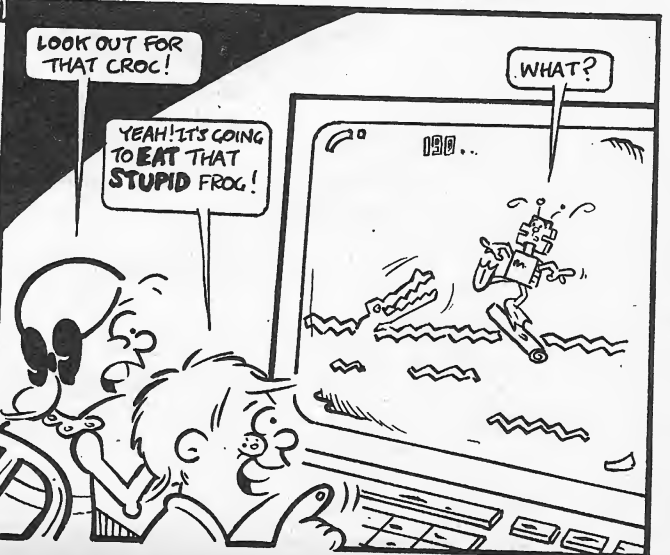
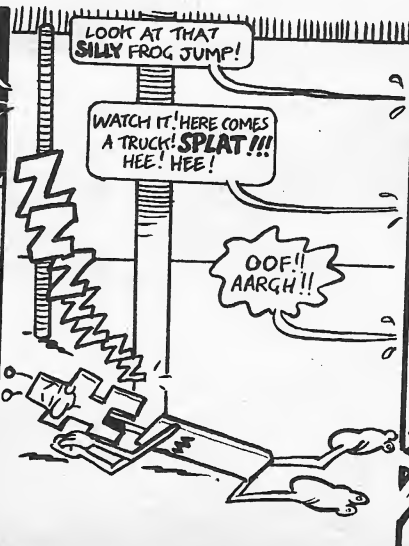
OOF!! AARGH!!

WHILE RAM IS KEEPING THEM BUSY I'LL SNATCH & GO WINKS AND WORRY ABOUT THE PLAN LATER.

LOOK OUT FOR THAT CROC!

YEAH! IT'S GOING TO EAT THAT STUPID FROG!

WHAT?



HELP ARRIVES FROM AN UNEXPECTED QUARTER!

IF YOU KIDS THINK YOU'RE PLAYING THAT DRAITED MACHINE ALL SUMMER YOU CAN THINK AGAIN! GET THAT ROOM CLEARED UP!

SIGH!
OKAY DAD!

PHEW

I'LL VACUUM
THE FLOOR, YOU
DUST THE
FURNITURE.

?!?!?

VRRMMM!

BY PIXEL
ANOTHER
WAR MACHINE!

VRRMMM!

IT'S
GAINING
ON ME!

CASP!
IT'S GONE
NOW...

CHOKE!
GERM
WARFARE!!
WHEEZE!

... BETTER
GET BACK
TO BASE...

LATER...

DON'T YOU THINK YOU'RE
TAKING THIS WHOLE
WILD WEST THING A
LITTLE TOO FAR ROM?
YOU LOOK RIDICULOUS!

HOW...

AND YOU CAN
CUT OUT THE
REDSKIN
DIALOGUE!

WAIT,
RAM, I...

SHEESH! YOU SMELL
DISGUSTING! SO MUCH
FOR CLEAN LIVING. GORF
KNOWS WHAT BUGS YOU'VE
BOUGHT IN HERE!

ANDY ROBB

MORE ADVENTURES WITH
ROM AND RAM
NEXT PRINTOUT!



HI! I'M BRAINY and I really rate computers. I'm in *Load Runner* every issue so write to me at 30-31 Islington Green, London N1 and I'll do my best to answer any questions you have. Believe me, no problem is too small... I can tell you why you should convince your parents to invest in a computer or I can end your *Loading* problems.

Remember, Brainy's the name and, by the way, I will pay £1 to anyone who's name is mentioned. Write away!

BRAINY'S BRAINBOX

Easy reading for the Spectrum

I HAVE thought for a long time that it would be a good idea to have a computer comic just for children. Now it's here I can ask if you can recommend a good Basic handbook with easy-to-understand programs and games? I have a Spectrum but I find the enclosed booklet difficult to understand.

Jenny Hanson, London

YOU SHOULD see the handbooks of some other computers. One thing about the Spectrum is that there are plenty of easy books for it. Avoid books written for no machine in particular, or for ones other than the Spectrum. Avoid ones for the Spectrum which are not easy to read. A specially good book is *Easy Programming for the ZX Spectrum* by Ian Stewart, published by Shiva. It sells at W H Smith.

Computer games for sale

I HAVE WRITTEN a number of computer games for the Vic-20 and I cannot find an address to which to send them. Please can you give me one?

George Wright, Hull

IF YOU HAVE short programs, send them to computer magazines

and you may get a few pounds if they are printed. Longer ones can be sent to companies which advertise Vic-20 software. Some of them are Quick-silva, 14 Palmerston Road, Southampton; Rabbit Software, 380 Station Road, Harrow, Middlesex; and Llamasoft, 49 Mount Pleasant, Tadley, Basingstoke, Hampshire. Standards are rising, and it is best to try your programs on friends first. Good luck, happy programming.

Writing on the screen

IS IT POSSIBLE to buy special pens so that you can write programs straight onto the screen? I am no good at typing; it takes me ages and I make loads of mistakes.

Load Runner fan, Plymouth

THERE IS nothing like that, yet. Perhaps you could try to invent one. I'm sure it would certainly be found useful by many *Load Runner* readers. There are special pens for some computers—for example, the Atari 800 and the Apple—which can be used to draw directly on to the screen with particular programs but few computers can understand human handwriting.

The reason cassettes are used to SAVE, reproduce, and sell programs is partly because of the difficulty and slow speed of typing; use cassettes for games, rather than copying long programs from books, which often have mistakes.

A safe place for storing discs

I HAVE a large number of discs for my BBC micro. I have lost or damaged a few because of the difficulty in storing them in a safe place. Is there any suitable case or carrier I can buy?

Melissa Layne, Eccles

DISC BOXES are sold in most computer shops, costing a few pounds. They are also often available free if a certain number of discs are bought at one time—15 or 20 onwards. Look in office computer shops rather than places which sell cheap machines.

* * *

Repeating problems on the ZX-81

WHEN I AM writing programs for my ZX-81 I often RUN into problems when I want a message repeated a certain number of times down the screen and then to carry on with the program. How can I do this?

Elizabeth Carter, Glasgow

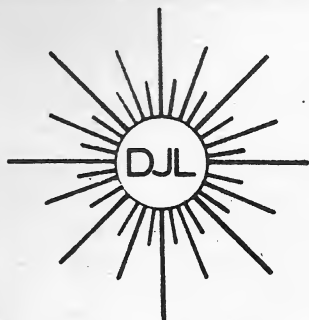
I HAVE a program which you can use or on which you can experiment: 10 FOR A = 1 TO 20 (the amount of times you want your message repeated)

20 PRINT "HI."

30 NEXT A

Because it makes a loop between FOR and the NEXT, it is called a FOR...NEXT loop. The program prints your message in a vertical line 20 times. If you want to PRINT it in a diagonal line, change line 20 to PRINT TAB A; "HI." and run the program.

I think all computers can run that program but most expect you to use TAB(A) not TAB A. Some, including your ZX-81, have AT as well as TAB. Then you can say exactly where you want your message to appear.



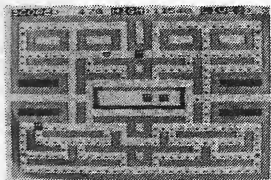
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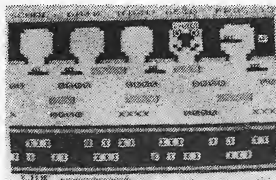
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TRUMBULL'S WORLD

IN THE OVERCROWDED AND OPPRESSED WORLD OF THE FUTURE, PROGRAMMER TRUMBULL DISCOVERS AN EQUATION THAT WILL HELP MAN TRAVEL TO ANOTHER GALAXY. HE IS IMPRISONED BY THE GOVERNMENT, LED BY THE EVIL SIMIAN. BEFORE HIS CAPTURE, HE DISGUISES THE EQUATION AS A CLASP AND HIDES IT IN THE ADVENTURE GAME HE HAS CREATED ON HIS COMPUTER. IN AN ATTEMPT TO SAVE THEIR FATHER, MARC AND JAN HAVE ENTERED THE ADVENTURE AND ARE SEEKING THE DIFFERENT SECTIONS OF THE CLASP.

OUT OF THE WOODS COMES THE SHAMBLING TERROR!

SNIFF
SNIFF

FATHER SAID HE LEFT CLUES. WE'VE MISSED SOMETHING!

WE MUST GO BACK AND LOOK. BUT HOW DO WE GET PAST THEM?

SCRIPT:
ROB BEATTIE

ARTWORK:
MALCOLM STOKES

LETTERS:
STEVE POTTER

THEY SILENTLY SKIRT THE TERRIBLE MENACE.

JAN: THEY'VE GOT NO EYES... THEY CAN'T SEE US!

THEY'RE TRYING TO FIND US BY SCENT, AND BY LISTENING... SHHH! FOLLOW ME.

"UNDER ROUND OVER GROUND..."

"FATHER'S SON'S THE ONLY ONE..."

THE CLUE'S IN THE DELL. IT HAS TO BE!

HURRY, I THINK I CAN HEAR THEM!

THE STONE! IT'S LIKE A CIRCLE!

I'LL PICK IT UP!

I CAN'T BUDGE IT!

JAN: I CAN SEE THEM! LET ME TRY!



MARC LIFTS THE
STONE EASILY!

"SINK OR SWIM... OR
THINK AND SKIM..."

WHY
COULDN'T
I LIFT IT?
IT WASN'T
HEAVY.

MARC!
IT'S PART
OF THE
CLASP!

OF COURSE!
BECAUSE
"FATHER'S SON'S
THE ONLY
ONE."

BEHIND
THEM, THE
SOUNDS OF
PURSUIT...

SSHH!
BACK
TO THE
RIVER.

JAN WRENCHES THE CLASP
FROM MARC AND HURLS
IT ACROSS THE RIVER!

I'M THE
FATHER'S
DAUGHTER,
LOOK! IT
WOULDN'T
HAVE WORKED
FOR YOU!

"FATHER'S DAUGHTER...OVER WATER."

I THINK
WE'RE
SUPPOSED
TO SKIM
IT.

OKAY!
BUT WE'VE
GOT TO GET
OUT OF
HERE!

NO! IT
HAS TO
BE ME!!

AFTER THE
ORDEAL, THEY
RELAX.

IN THE NICK
OF TIME
THEY ARE
SAFE!

WELL...
I DON'T
THINK MUCH
OF FATHER'S
SENSE OF
HUMOUR.

COME ON. IT'S
STILL A GAME. A BIT
ROUGH THAT'S ALL.
ANYWAY, WE CAN'T STAY
HERE, WE'VE GOT TO
FIND THE REST OF THIS.

THEY TREK WEST... TIRED,
HUNGRY AND THIRSTY.

WISH
WE'D FILLED
THE DAMN
BOTTLE
UP...

STOP
MOANING.
WHAT'S THAT
SOUND?

JAN FINDS
A SURPRISE
AND A
CLUE!

IT SAYS:
"I AM
STRONGER THAN
I LOOK. I COULD
BE USEFUL IN
DAMNATION
CANYON. DON'T
LOOK. DON'T
LISTEN."

NEVER
MIND ABOUT
THE BIRD, JAN,
BEHIND YOU!!



KRAAAAKK!



Robots rule OK!

The invasion of the metal men has started . . .

THE ROBOTS are coming. In fact, they have already arrived. In Japan robots have been building cars for several years and now they are invading British car factories. At the British Leyland Cowley plant, £32 million is being spent on employing robots to manufacture the new Maestro. By the end of the year the robot population will have increased to 116.

The robots are used to weld car bodies, paint them and afterwards to test them for possible water leaks. Finally the braking performance of the car is tested on a computerised rolling pad.

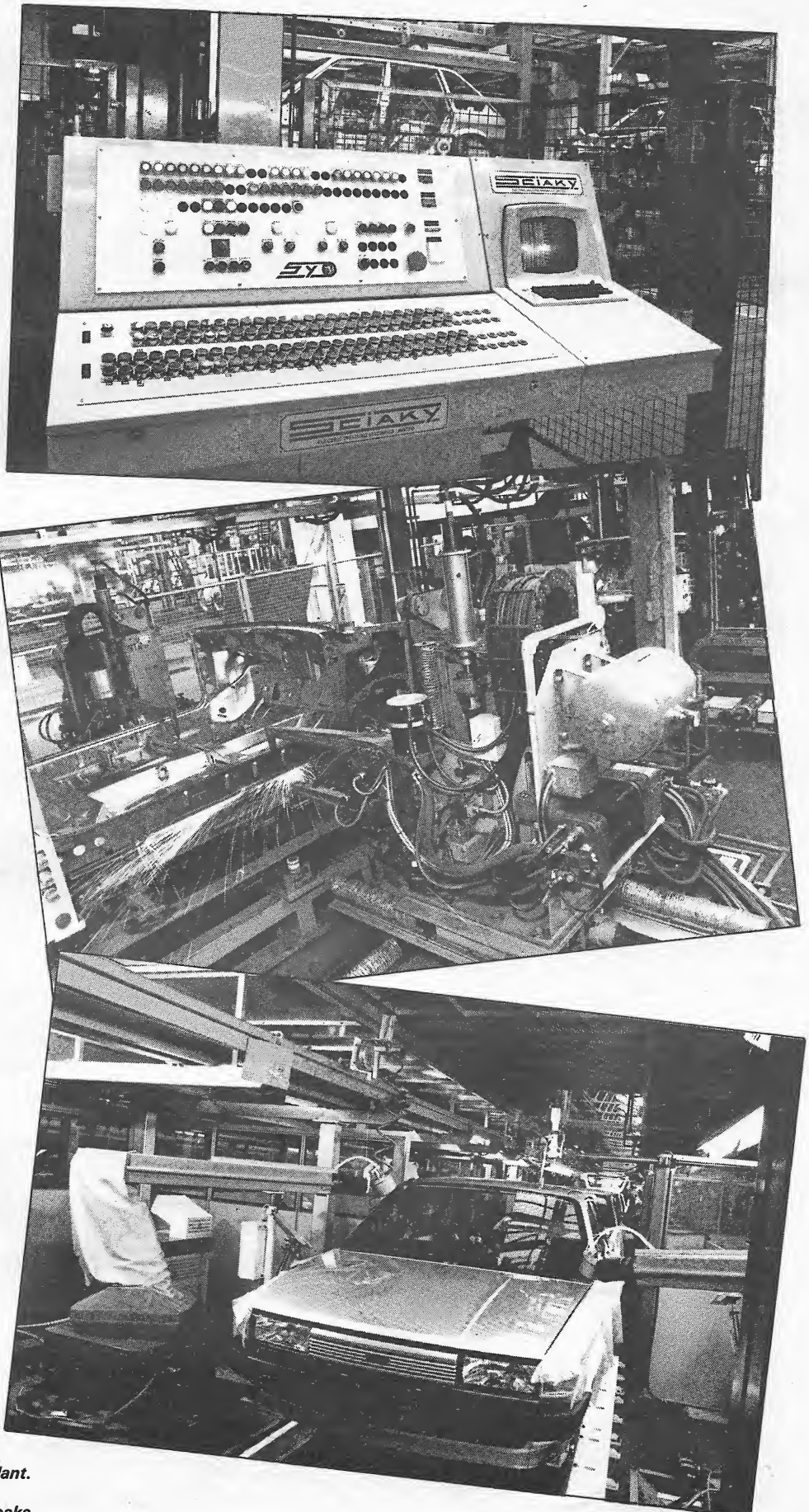
A steady flow of car parts and materials is ensured by the programmable controllers which are linked

'They can carry out operations in the most hostile environments'

to a central computer. Those controllers deliver the proper parts to the assembly line at the correct time.

The robots are apparently happy in their work. Andy Barr, managing director of operations at Austin Rover, said: "They do not suffer from fatigue. They can carry out operations at peak efficiency in the most demanding and hostile environments. Even the most skilled, dedicated worker cannot hope to approach their capacity for repeatability—the capacity to carry out an operation correctly, without variation, for hour after hour, day after day, week after week."

It looks as if the robots are here to stay, working side by side with humans, and it can safely be said that the incident described in Countdown to Chaos in this printout is wildly improbable.



Top right: computer controls at the Cowley plant.

Middle right: robot welders.

Lower right: robots testing cars for possible leaks.

THE INVASION OF THE ARCADIANs

SCRIPT -
LES COOKMAN
ART -
JOHN STOKES
LETTERS -
S. CRADDOCK

ARCADES THROUGHOUT THE CITY HAVE RECEIVED A GAME CALLED *mind warp* UNDER MYSTERIOUS CIRCUMSTANCES. THE GAME HAS A TERRIBLE EFFECT ON SOME YOUNG PLAYERS... THEY BECOME *DAZERS*, SEEMINGLY UNDER THE CONTROL OF AN UNKNOWN FORCE.

BUT NOT EVERYONE IS AFFECTED...

I CAN'T SEE WHAT'S SO WEIRD ABOUT THIS GAME. IT JUST GIVES ME A HEAD-ACHE, NOTHING TO IT.

PERHAPS IT'S ME... IT'S SO BORING. WHY DO THEY KEEP WANTING ME TO PLAY?

PERHAPS YOU'RE NOT TRYING HARD ENOUGH! MAYBE YOU COULD DO WITH SOME HELP!

...IN LEARNING WHEN YOU'RE NOT WANTED!

I'M SURE YOU COULD DO WITH SOME HELP...

I'M GIVING YOU THE ELBOW - PUNK!



I COULD HAVE MANAGED THEM MYSELF... BUT THANKS FOR THE HELP.

END GAME



MY PLEASURE. THEY WON'T BE NEEDING THESE ANY MORE.



LISTEN, AGGIE... THIS IS GOING TO HAPPEN AGAIN AND AGAIN, UNLESS YOU HELP ME GET RID OF THIS DANGEROUS GAME AND ITS FOLLOWERS.

MEET ME AT THE OLD CHAPEL IN BULKEN STREET AT NOON TOMORROW AND I'LL EXPLAIN ALL ABOUT IT.



A SMALL FIGURE RUNS IN THE URBAN JUNGLE. CHASING...



...OR BEING CHASED?

DAZERS HUNTING ANOTHER NORM!



A HAND GRABS THE FIGURE AS IT SPEEDS PAST...

O! GET YER 'AND...



SHE'S DODGED INTO THAT ALLEY - NOW WE'VE GOT HER!



THE HUNTERS
CORNER THEIR
PREY...

...OR DO THEY?



MORE HASTE...
LESS SPEED!
FANCY BUMPING
INTO YOU BOYS!



YOU NEED HELP...
AND YOU CAN HELP,
TOO. MEET ME AND
SOME FRIENDS
AT NOON...



AT NOON THAT
DAY, VARIOUS
YOUTHS ARRIVE
AT THE DERELICT
CHAPEL...



WELL, I DON'T KNOW
WHO YOU ARE... BUT
MY NAME'S BENNY,
I DON'T KNOW WHY
I'M HERE...



PERHAPS I'D
BETTER CLEAR UP
THIS MYSTERY
RIGHT AWAY.



I'VE ASKED YOU
ALL HERE BECAUSE
OF THE DAZERS, AND
THAT TERRIBLE GAME
MIND WARP...

AND FROM NOW
ON, WE ARE ALL
IN DANGER...



BUT, IN THE
SHADOWS...

HOW RIGHT
YOU ARE...
NORM... HOW
RIGHT YOU
ARE!

TO BE
CONTINUED!

Space programs

Computers in space are making pilots redundant

WHEN THE U.S. space shuttle blasted-off from Cape Canaveral on June 18 the world knew that its crew of five included Dr Sally Ride, the first American woman astronaut.

What was perhaps less well-known was that Challenger also carried five general-purpose computers and the most sophisticated software system ever developed for aerospace—a system so sophisticated that it made the crew virtually redundant.

The computers used on space shuttles are programmed to operate every function of the spacecraft except that of docking with other craft, when the pilot has the option of manual control and all the five computers are used for critical stages of shuttle missions—launch, ascent, re-entry and abort.

A host of hardware is incorporated in the computer system, including four VDUs to display information to the crew, and 300 black boxes, using 300 miles of wire, to provide triple safety factors for each function of the operations of the shuttle.

Besides ensuring efficiency and safety on manned space missions, aerospace computer technology contributes significantly in other fields. Spin-offs from the computer programs have benefitted skyscraper design, oilfield production and the translation of documents from one language to another.



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COMPUTATIONS

FIND the computer words in this grid. There are six words and you can read them across, down or diagonally.

Wordplotter 3

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| M | K | S | I | V | E | L | E |
| N | E | M | C | R | E | N | N |
| I | B | C | O | O | L | I | I |
| T | O | H | O | T | R | H | P |
| O | A | I | B | R | R | E | C |
| R | R | P | I | I | Y | B | S |
| D | I | S | C | U | I | T | D |

A COMPUTER is used to control the flow of oil in the engine of a car. Unfortunately it is not functioning properly and the oil is being used up faster than normal.

The table displays all the data needed to find how long it would take for all the oil to run out.

| | |
|--------|------|
| Hour 1 | 3.2 |
| Hour 2 | 10.4 |
| Hour 3 | 17.6 |
| Hour 4 | 24.8 |

There are 46.4 units of oil in the car. How long before the fuel runs out?

ANSWERS to the puzzles in last printout:

The Apple IIe uses 30 units of power to keep its real-time clock running for an hour.

True or false:

(b) was false. A computer does not control the movement of the trains but it does control time-table alterations.

The last card sorted by our computer fell on pile one.

WORDPLOTTER 2 SOLUTION

| | | | | | | | | | | | | | | | |
|----|---|---|----|---|---|----|---|----|----|---|---|----|---|----|---|
| 1 | T | R | A | C | 3 | E | | 4 | M | O | 5 | D | E | 6 | M |
| | R | | N | | | N | | | A | | | O | | | I |
| 7 | U | L | A | | | 8 | D | I | G | I | T | A | L | | |
| | T | | L | | | | | | N | | | | | | E |
| 9 | H | A | Y | W | | 10 | I | R | E | | | 11 | B | U | S |
| | | | S | | | M | | | T | | | U | | | |
| 12 | B | I | T | | | 13 | P | A | S | T | I | M | | 14 | E |
| | A | | | | | R | | | | | | L | | N | |
| 15 | S | Y | 16 | S | T | E | M | 17 | S | | | 18 | T | O | T |
| | I | | I | | | S | | | U | | | I | | E | |
| 19 | C | E | N | T | S | | | | 20 | M | I | N | O | R | |

Across

1. Load Runner in a previous existence (4,5)
8. American micro for the teacher? (5)
9. Little Robert to return with a modern machine (5)
10. Feline may list your programs (3)
11. Pressed RETURN and started the exam (7)
13. How companies are like a micro's memory! (7)
15. Curve of a bright lamp (3)
16. Signs of correctness on parasites (5)
18. Bits of the abacus? (5)
19. What's all the fuss about? (9)

Down

2. What goes into a computer (5)
3. One of an array of simple chemicals (7)
4. Optical character recognition (3)
5. Prepare to start with orange (5)
6. What the first computers had to do (9)
7. What *you* should do when buying a micro! (5,4)
12. Quite a lot with a nice 0 or 1 (4,3)
14. Modern midget (5)
15. What the computer asks at the end of a loop? (5)
17. Use a long spoon when you do this with the devil (3)

★ WIN A COMPUTER GAME ★

★ *Great competition next printout* ★

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